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Citation for final published version:

Khehra, Rajinder, Fairchild, R and Morgan, Maria ORCID:
<https://orcid.org/0000-0002-5182-7222> 2018. UK children's breakfast cereals - an oral health perspective. British Dental Journal 225 , pp. 164-169.
10.1038/sj.bdj.2018.531 file

Publishers page: <http://dx.doi.org/10.1038/sj.bdj.2018.531>
<<http://dx.doi.org/10.1038/sj.bdj.2018.531>>

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UK CHILDREN'S BREAKFAST CEREALS - AN ORAL HEALTH PERSPECTIVE.

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Key words: oral health, children, nutrition, breakfast cereals

Word count including abstract – 3,175

Abstract - 387

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ABSTRACT

Background: Breakfast cereals remain popular with UK children. Although they are eaten primarily at breakfast time, they are regularly consumed between meals, because they are quick and easy to prepare. However, many breakfast cereals contain high levels of sugar, based on total product weight—with some values exceeding one-third sugar. Regular consumption of high-sugar breakfast cereals is concerning in terms of dental and general health, due to their relationship with dental caries and excess energy intake, which can lead to obesity and its associated conditions, including type 2 diabetes and coronary heart disease.

Aim: To investigate oral and general health messages contained on breakfast cereal packaging of brands popular with UK children.

Methods: Nine of the most popular branded cereals available in the UK, marketed to children, were evaluated in this study. One breakfast cereal (Coco Pops) was examined in greater detail, using all branded and UK supermarket own brand versions; culminating in a total of 13 breakfast cereals included in the study. The content of the packaging was analysed with regard to their imagery, health claims and nutritional content.

Results: At the manufacturer's suggested portion size, 8 of the 13 cereals provided over one-half of the recommended daily sugar intake for a 4–6-year-old child. Moreover, the imagery of the portion size on the front of the packaging was misleading—manufacturer's recommended portion sizes were at least two-thirds less than those depicted. Nutritional claims focussed on “vitamins”, especially folic acid and minerals, notably “iron”. “Whole grains” and “no artificial colours or flavours” were legitimate claims. Only 2 cereals did not use the voluntary front-of-pack labelling system, both of which were supermarket brands.

Cartoon characters, royal endorsements and QR codes were used to promote the breakfast cereals.

Conclusions: Most of the breakfast cereals contained high sugar levels, and although marketers made legitimate claims about other nutritional constituents, these claims might mislead consumers into thinking the cereals are healthier than they purport to be. Imagery of portion size was grossly misleading and gives cause for concern. Dental and other health professionals need to be aware of the high sugar content of these cereals and the marketing techniques that are used by their manufacturers when giving advice to children and their parents. It is crucial that these professionals keep up to date with current evidence-based healthy eating guidelines.

INTRODUCTION

Breakfast cereals are the most popular breakfast choice eaten by school-aged children. Nine out of every 10 UK children aged between 7 and 10 years regularly consume cereal at breakfast time¹. Although breakfast cereals are traditionally referred to as a breakfast meal, a market research survey of 1,360 internet users aged 16+ years who have eaten cereals in the past 6 months reported that 42% ate breakfast cereals at times other than breakfast¹. Their frequent consumption throughout the day means that cereals and cereal products are the second largest contributor of free sugars in children's diets: breakfast cereals account for 8% and 7% of free sugar intake in children (4–10 years) and teenagers (11–18 years)².

Consuming excess free sugar in food and drink is detrimental, increasing the risk of obesity, which is associated with greater risks of developing type 2 diabetes, hypertension, coronary artery disease and various cancers³. It is believed that 1 in 20 cancers in the UK is linked to being overweight, and this is associated with 13 types of cancer, including breast, kidney, liver colorectal and pancreatic cancer⁴. It is also a well-established risk factor for tooth decay.³

Breakfast is regarded as an important start to the day. A study of 3,275 New Zealand children, aged 5–14 years, reported that those who tended to skip breakfast had a higher BMI, were significantly less likely to meet recommendations for fruit and vegetable consumption and were more likely to be consumers of unhealthy snack food products⁵. In a survey of 656 Swiss schoolchildren, aged 7 to 10 years, Baldinger et al.⁶ reported that breakfast contributes to academic achievement: skipping breakfast had detrimental effects on short-term and episodic memory, problem-solving, attention and motor function skills⁶. A recent randomised control trial of breakfast cereals in 71 16–19-year-old girls in the UK demonstrated improved

intake and biomarker levels of several B vitamins, iron and vitamin D in a fortified breakfast cereal intervention group after 12 weeks⁷.

As part of the European Union provision of food information to consumers front of pack (FOP) colour code labelling (so called traffic light labels) is voluntary. Voluntary FOP nutrition labelling cannot be given in isolation; it must be provided in addition to the full mandatory “back of pack” nutrition declaration. The colours red, amber and green enable an assessment of the nutritional properties of a food, however some manufacturers choose not to use the colour coding system. For sugars the cut off points for low, medium and high are $\leq 5.0\text{g}/100\text{g}$; $> 5.0\text{g}$ to $\leq 22.5\text{g}/100\text{g}$; and $> 22.5\text{g}/100\text{g}$ ⁸.

EU rules on nutrition and health claims can be used by food businesses to highlight specific benefits of their products in relation to health and nutrition on the product label and/or advertising. Nutrition claims such as "low fat", "high fibre" and health claims such as "Vitamin D is needed for the normal growth and development of bone in children" are covered by these regulations, thus ensuring that any claim made on food labelling or advertising is clear, accurate and based on scientific evidence. Food bearing claims that could mislead consumers are thus prohibited⁹.

This paper analyses the packaging content of the most popular breakfast cereals that are marketed to children in the UK, focussing on nutritional information with particular reference to oral health.

METHODOLOGY

The most popular UK breakfast cereals that were marketed to children in 2013 were selected by consulting the most recent (2012) Mintel Report on Breakfast Cereals¹. Mintel, however, did not distinguish between cereals that were marketed to children and those marketed to adults. Therefore, the 15 most popular cereals were assigned to one of three categories—Children only, Children and Adults and Adults only (Table 1)—by examining the product packaging and, when available, television advertisements. Breakfast cereals that were associated with cartoon characters and children’s promotions were placed in the Children only category, those that were associated with families were assigned to the Children and Adults category and the remainder constituted the Adults only category.

Table 1 Here

Following categorisation, nine cereals that were marketed to ‘Children only’ or ‘Children and Adults’ were selected for investigation (Table 1). Kellogg’s Coco Pops was chosen specifically as the brand leader of cereals that are marketed to children to compare it with supermarket-brand versions, where available (Asda, Sainsbury’s, Morrison’s, Tesco). All products were purchased in the spring of 2013 from major UK supermarkets.

A content analysis of the thirteen selected product labels was performed. Themes and categories emerging from the data were recorded manually¹⁰. Codes included: nutrition claims, emotive words, FOP and Back of Pack (BOP) labelling, cartoon characters, promotions, vitamin and mineral content and links to other websites and social media. FOP labelling indicated which cereals were green (low), amber (medium) or red (high) with regard to total fat, saturated fat, total sugars and salt per the UK Food Standards Agency (FSA) FOP labelling guidelines⁸. Nutritional content and serving size were recorded in a Microsoft Excel

2010 spreadsheet. Frequencies and graphical representations of the data were generated using Microsoft Excel 2010.

RESULTS

Sugar

Four of the nine branded breakfast cereals contained high levels of sugar, defined as over 22.5% of the EU Reference Intake (RI)⁸: Kellogg's Frosties, Coco-Pops, and Crunchy Nut Cornflakes and Honey Monster Foods Sugar Puffs, with more than 30% sugar in each. Kellogg's Frosties contained the highest percentage of sugar (37%), equal to 11.1 g per 30g serving (Figure 1). Four cereals contained medium amounts (defined as between 5% and 22.5% of the EU RI): Nestle Cheerios and Shreddies and Kellogg's Rice Krispies and Cornflakes (ranging from 8% to 21.4%); only Weetabix contained low levels (4.4%), defined as less than 5% of the EU RI⁸.

There were no differences in the sugar content of three of the supermarket-brand versions or Kellogg's Coco Pops, each containing 35%. Only Morrison's Choco Crackles differed, with 36.5% sugar. Thus each of these chocolate rice based cereals were in the high sugar category⁸ (Figure1).

Fat, Saturated Fat and Salt

Most branded and supermarket-brand cereals (11/13) contained low levels of total fat defined as less than 3% of the EU Reference Intake⁸. Only Nestle Cheerios (4%) and Kellogg's Crunchy Nut cornflakes (5%) had medium levels of total fat, defined as 3% to 17.5% of the EU RI (Table 2). All nine branded cereals contained low levels of saturated fat, defined as under 1.5% of the EU RI (Table 2), whereas, all four supermarket-brand varieties of chocolate rice-based cereals contained medium levels of saturated fat, defined as 1.5% to 5% of the EU RI (Table 2).

Twelve of thirteen breakfast cereals were classified as containing medium salt levels, defined as 0.3% to 1.49% of the EU RI, with only 'Honey Monster Foods Sugar Puffs', classified as being low in salt, defined as under 0.3%⁸ (Table 2).

Nutrition Claims

Twelve different nutrition claims were made by the breakfast cereal manufacturers, several of which featured more than once. Figure 2 emphasises the frequency of each nutrition claim, those that appeared more often are written in a larger font in the figure. The most frequently cited nutrition claim was "a source of folic acid" (7/13), followed by "added vitamins" not specified (6/13), "iron" (5/13) and "vitamin D" (4/13). "Wholegrain" and "source of fibre" each appeared on 3 of 13 packages. "Calcium", "low fat", "no hydrogenated fats" and "low sugar" each appeared once on the labels.

Emotive words

Emotive words and phrases were common on the packaging. They could be classified as appealing to children, based on the taste or fun associated with the product e.g. 'yummy', 'magical steps' or 'meet new friends'. Children and parents were also enticed with statements such as 'delicious' or 'deliciously tasty'. Parents were further targeted by suggestions that the cereal is a healthy breakfast option such as 'wholegrain guaranteed' or 'wholegrain goodness' and reassurances that the product is not over-processed through statements that it is made using 'simple steps' and "preservative free". A degree of trust is also established with phrases such as 'our promise to you'. The frequency of these words is depicted in Figure 3, with larger words reflecting more common occurrence.

Front of pack labelling

All cereals included a full mandatory BOP nutritional declaration⁸. Eleven of 13 cereals (all except Weetabix and Sugar Puffs) also opted to use the voluntary FOP labelling scheme⁸.

Only two of the cereal packages (Asda Choco Snaps and Sainsbury's Choco Rice Pops) bore the red-amber-green traffic light system to highlight the levels of fat, sugar and salt. The remaining nine products with FOP labelling did not use the Food Standards Agency preferred method, opting for a monochrome FOP system. Half (2/4) of the supermarket-brand versions of chocolate rice based cereals (Asda and Sainsbury's) chose the coloured FOP labelling system.

Portion sizes

The manufacturer's packet recommended serving sizes of the breakfast cereals followed the guidelines of the European Breakfast Cereal Association¹¹. Eleven of 13 cereals recommended a portion size of 30g with a 125ml serving of milk; Nestle Shreddies and Weetabix recommended serving sizes of 40g and 37.5g respectively and gave no reference to milk volume.

With regards to cereal bowl imagery, nine of the examined cereal packages (the four supermarket chocolate based rice cereals, Kellogg's: Coco Pops, Cornflakes, Crunchy Nut Cornflakes, Frosties and Rice Krispies) depicted a portion size as a bowl brimming to the top with cereal and milk (Figure 4). This contrasts with a weighed 30g portion with 125ml of milk in a promotional bowl (Figure 5). To fill a bowl filled to brimming three portions were required, i.e. 90g of cereal with 375ml milk – equating to 31.5g of added sugars (Figure 6).

DISCUSSION

The recent update in UK nutritional recommendations for sugar states that free sugars should not exceed 5% of total dietary energy for age groups from 2 years upwards¹². Public Health England indicates that this is no more than 19g per day for children aged 4 to 6 years, no more than 24g for children aged 7 to 10 years and no more than 30 g for those aged 11 to 18 years¹³. Eight of the 13 cereals in this study would provide more than a half of the recommended sugar intake for a 4-6-year-old, if eaten at the recommended portion size. This reflects recent findings from the UK National Diet and Nutrition Survey¹⁴, that children “consume half their recommended maximum daily intake of sugar at breakfast”.

A recent US study of 158 breakfast cereal packages examined the relationship between portion size imagery and behaviour, reporting that on average portion size depictions were 64.7% larger than the recommended portions on the nutrition panel. In addition, boxes that displayed exaggerated serving sizes led people to pour 42% over the suggested serving size into a bowl¹⁵. Our findings suggest that the portion size depicted is three times larger than that recommended on the nutrition panel of the packaging. This suggests that if the imagery on the cereal packet is imitated (Figure 4), children aged 4-10 would be exceeding their daily limit of free sugars by 12.5 or 6.5g by eating this one bowl of cereal alone.

Some manufacturers have voluntarily attempted to reduce sugar content because of the extensive on-going media coverage of the subject. For example “Sugar puffs” was rebranded as Honey Monster Puffs in 2014 (after the data collection for this study) to coincide with a 25% reduction in sugar, displacing it from a high-sugar to a medium sugar cereal¹⁶. However, overall breakfast cereal sugar content has not changed significantly in the UK between 1992 and 2015, remaining high¹⁷.

Public Health England is in the process of addressing the issue of high-sugar cereals that are marketed to children in the UK. The UK Government's Childhood Obesity Plan¹⁸, implemented in August 2016, states that all sectors of the food and drink industry will be challenged to reduce overall sugar across a range of products (including breakfast cereals) that contribute to children's sugar intake by at least 20% by 2020¹⁹.

Fat, saturated fat and salt

None of the cereals contained high levels of fat or saturated fat, although all four of the supermarket-brand versions of "Coco Pops" were classified as having medium levels of saturated fat, compared with low levels in the Kellogg's version. This is likely to be due to differences in the manufacturing process, as supermarket-brand cereals are typically made from an extruded dough rather than from individual cereal grains²⁰. Even at three times the portion size (e.g. the portion size imagery that is shown on the packaging) the contribution of total or saturated fat to the diet is unlikely to be significant.

Salt levels in all of the cereals met the FSA 2012 maximum voluntary target of 1.125g salt/100g²¹, with the exception of Kellogg's Cornflakes. However, based on the stricter 2017 maximum voluntary target of 1g salt/100g Kellogg's Cornflakes, Rice Krispies and Nestle Cheerio's exceeded this target. Since data collection only Nestle Cheerios has been reformulated to meet the new voluntary targets (now providing 0.93g salt/100g), reflecting the findings of Pombo-Rodrigues et al¹⁷ who reported a significant reduction in salt content of ready-to-eat breakfast cereals in the UK between 1992 and 2015.

FOP labels

All cereals included a full mandatory BOP nutritional declaration⁸ and all except Weetabix and Sugar Puffs opted to use the voluntary FOP labelling scheme. However, the majority of cereals used the monochrome FOP label to indicate the levels of fat, saturated fat, salt and sugar in the products. The FSA-preferred coloured traffic light system has helped consumers identify healthier products most consistently²². Had the FSA-preferred scheme been used for the products in this study, red and amber labels would have predominated, encouraging the consumption of the healthier products in this cereal category. Paradoxically, one of these healthier choices would be Weetabix; yet, it did not bear the FOP label.

Nutrition claims

All nutrition claims made were legitimate for sale in the EU, including the UK⁹. For instance only one product proclaimed 'low sugar'. Products that display nutrient content claims can create a halo effect, such that consumers perceive the product as more healthful than warranted, or ignore other relevant nutrition information²³. Most products (11/13) made a nutrition claim regarding one or more vitamins; yet, 8/13 were extremely high in sugar. This type of misdirection is concerning and needs to be addressed by government and public health policy makers. Action is now required to: reduce the amount of free sugars in food and drinks; restrict marketing and promotion of sugar-containing products; and reduce the amount of sugar-containing food and drinks sold³. This should result in a healthier environment promoting reductions in free sugar intakes similar to the achievements of the UK salt reduction strategy (years)²⁴.

Emotive words

The emotive words that were used on the cereal packaging, focussed on three main areas those relating to quality (“Whole-grain guaranteed”), palatability (e.g. ”Yummy”, “Tasty”) and fun (“Gr-r-eat”, “pop”). The words that were used could appeal to children and their parents. These results largely reflect the findings of other researchers^{25,26} who found quality, taste, humour, action-adventure, fantasy, and fun to be frequently deployed, appealing themes for children. Such practices are likely to enhance the impulsivity of children to choose a particular product at the point-of-sale²⁷. However, with regards to breakfast cereals more serious health and nutrition appeals are also apparent and these would appeal to parents²⁶. The terminology that relates to the production of the cereals can be seen as a two-pronged approach, directed to both children (magical steps) and adults (simple steps).

CONCLUSIONS

Most of the breakfast cereals in this study contained high sugar levels and although marketers used legitimate claims about other nutritional constituents, such declarations could mislead consumers into thinking that the cereals are healthier than they purport to be.

Imagery of portion size was grossly misleading and gives cause for concern with regard to oral (dental caries) and overall health (overweight and obesity). Of particular concern is that cereal packet imagery falls outside the Committee of Advertising Practice code relating to High Fat Salt Sugar marketed to children²⁸.

Dental and other health professionals need to be aware of the high sugar content of these cereals and the marketing techniques that are used by their manufacturers when giving nutritional advice to children and parents. It is crucial that these professionals keep up-to-date with current evidence-based healthy eating guidelines such as Change4Life²⁹ and NHS Choices³⁰.

Fundamentally, action is required at a macro level, Government, health agencies and food manufacturers must work together to address marketing and reformulation of high sugar food products, including breakfast cereals. The UK Government's Childhood Obesity Plan, a plan for action, has made a start to reduce overall sugar content across a range of food products (including breakfast cereals) that contribute to children's sugar intake by at least 20% by 2020¹⁸.

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Table 1 Breakfast cereal categorisation

	Target Market		
Popularity ranking*	Children only	Children and Adults	Adults only
1			Kellogg's Special K
2		Weetabix	
3		Kellogg's Crunchy Nut	
4			Quaker Oats So Simple
5		Kellogg's Corn Flakes	
6	Kellogg's Coco Pops		
7		Nestle Cheerios	
8		Nestle Shreddies	
9	Kellogg's Rice Krispies		
10			Nestle Shredded Wheat
11	Kellogg's Frosties		
12			Weetabix Alpen
13			Kellogg's All-Bran Flakes
14			Dorset Cereals
15	Honey Monster Sugar Puffs		

*Source: Mintel (2012)

Table 2 Total fat, saturated fat and salt content of the leading UK children's breakfast cereals per 100g

Cereal Name	Brand	Fat	Saturated Fat	Salt
Choco Snaps	Asda	2.9	1.6	0.8
Sugar puffs	Honey Monster Foods	1.6	0.2	0.1
Coco Pops	Kellogg's	2.5	1	0.75
Cornflakes	Kellogg's	0.9	0.2	1.3
Crunchy Nut	Kellogg's	5	0.9	0.9
Frosties	Kellogg's	0.6	0.1	0.9
Rice Krispies	Kellogg's	1	0.2	1.15
Choco Crackles	Morrison's	3	1.6	0.7
Cheerios	Nestle	4	1	1.04
Shreddies	Nestle	1.9	0.4	0.76
Choco Rice Pops	Sainsbury's	3	1.6	0.73
Choco Snaps	Tesco	2.9	1.6	0.7
Weetabix	Weetabix Ltd.	2	0.6	0.65

Figure 1 Sugar content of the breakfast cereals (g/100g)

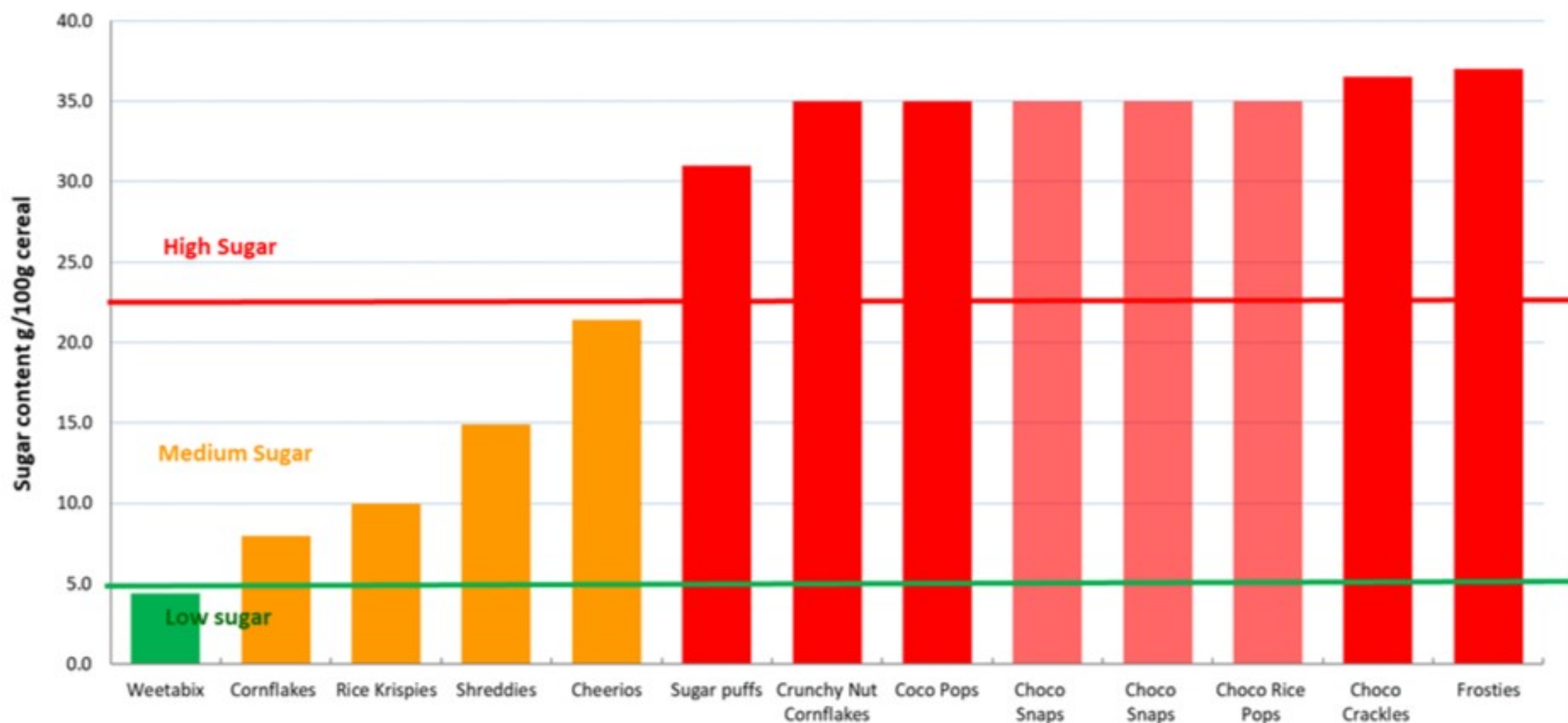
Figure 2 Nutrition and similar claims present on cereal packaging

Figure 3 Emotive words and phrases on cereal packaging

Figure 4 Collage of photographs displaying cereal bowl imagery on the 13 examined breakfast cereals created by visiting www.photovisi.com

Figure 5 Recommended serving size of Kellogg's Coco Pops cereal and milk in a promotional Kellogg's bowl

Figure 6 Serving size of Kellogg's Coco Pops cereal and milk to achieve a full bowl as depicted on packaging



**Green, Amber, Red refers to the FSA FOP labelling system, where low sugar (green) relates to 5g/100g; medium sugar (amber) 5-22.5/100g and high sugar (red) over 22.5g/100g.*

Source of fibre

VitaminD Iron

Low sugar
colours or flavours

Folic-acid

Low fat Calcium
No artificial No preservatives

Wholegrain

No hydrogenated fats

No artificial colours or flavours

Added vitamins

Simple-steps
Yummy ^{fuel} ^{layers} grains
wholegrain-guaranteed
Crackling chocolate wholegrain
little crackle simple
delicious shreddie brighten
steps pop mum
reading new edition says breakfast
late bowl wait world
really friends snap cereal
irresistibly cool rocks Limited
golden every Toasted
flakes satisfaction day nurtured
help meet captain gr-r-reat
perfection lovingly
goodness
Magical-steps
tasty





